

What is Claimed is:

1. A system for guiding a device toward an object comprising:  
means for generating a guidance command signal from: a vectored  
line-of-sight (LOS) between a device and an object using a position parameter of  
the object relative to a guidance frame, and an estimated object state produced in  
5 the guidance frame using the vectored line-of-sight; and  
means for transmitting the guidance command signal to an on-board  
guidance control of the device.
2. A system for guiding a device toward an object in accordance with  
10 claim 1, wherein the means for generating a guidance command signal creates an  
estimated object to device range vector, an estimated object to device velocity  
vector and an estimated object acceleration vector.
3. A system for guiding a device toward an object in accordance with  
15 claim 2, wherein the means for generating a guidance command signal creates an  
estimated object acceleration rate vector.
4. A system for guiding a device toward an object in accordance with  
claim 1, wherein the means for generating a guidance command signal is  
20 periodically adaptive.

5. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:

5 means for generating a set of probability weights.

6. A system for guiding a device toward an object in accordance with claim 5, wherein the sum of the probability weights for any axis of the guidance frame is unity.

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7. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal uses sequential line-of-sight (LOS) vectors in the guidance frame.

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8. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises: at least one Kalman filter bank.

9. A system for guiding a device toward an object in accordance with claim 8, wherein the at least one Kalman filter bank is harmonically balanced.

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10. A system for guiding a device toward an object in accordance with claim 9, wherein each of the at least one Kalman filter bank is associated with a  
5       respective axis in the guidance frame.

11. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:  
10       a proportional navigation controller.

12. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises;  
15       an augmented proportional navigational controller.

13. A system for guiding a device toward an object in accordance with claim 1, wherein the means for generating a guidance command signal comprises:  
20       a classical optimal controller.

14. A method for guiding a device toward an object comprising the steps of:  
20       creating a vectored object line-of-sight (LOS) in a guidance frame;  
      producing an estimated object state, using sequential object LOS;

using proportional navigation control to create a device guidance  
command as a function of an estimated range vector and an estimated velocity  
5 vector obtained using the estimated object state.

15. A method for guiding a device toward an object in accordance with  
claim 14, wherein the estimated object state is adaptively produced.

10 16. A method for guiding a device toward an object in accordance with  
claim 15, comprising the steps of:

creating a periodically adaptive guidance command using estimated  
object state; and,

15 adding the periodically adaptive guidance command to the device  
guidance command.

17. A method for guiding a device toward an object according to claim  
15, wherein the step of creating a device guidance command comprises the step  
of:

20 creating a guidance command operating on device acceleration to  
compensate for autopilot lag.

18. A method for guiding a device toward an object according to claim  
16, wherein the step of creating an periodically adaptive guidance command  
5 comprises the step of;

using a function of object maneuver frequencies, time-to-go before  
intercept, maneuver frequency correlation time constants, estimated target  
accelerations and estimated object acceleration rates.

20. A method for guiding a device toward an object in accordance with  
claim 14, wherein the step of creating a vectored object line-of-sight comprises the  
steps of:

- a) obtaining azimuth, elevation and range information of an  
object;
- 15 b) using the azimuth, elevation and range information for vectored  
LOS reconstruction to create a unit vector representative of the object's orientation  
in a guidance frame of the device; and,
- c) applying the range information to the output of the vectored  
LOS reconstruction to create the estimated range.

21. A method for guiding a device toward an object in accordance with  
claim 20, wherein the step of producing an estimated object state comprises the  
step of:

processing plural sequential estimated range vectors into an object state estimator in an inertial guidance frame estimated object state, wherein the  
5 estimated object state can include range, velocity, object acceleration and object acceleration rate.

22. A guidance system for guiding a device toward an object comprising:  
means for generating a signal representing a predicted position of  
10 the object from: object position parameters relative to a guidance frame and a periodically adaptive estimated object state produced in the guidance frame using the object position parameters; and,  
means for transmitting the signal to an on-board guidance control of  
the device.

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23. A guidance system for guiding a device toward an object according to claim 22, comprising;  
a fire control platform  
wherein the means for generating a signal representing the predicted  
20 position of the object is located on the fire control platform, and the fire control platform is remote from the device.

24. A method for guiding a device toward an object comprising the steps of:

5                   obtaining object position parameters;  
periodically adaptively producing an estimated object state;  
creating a predicted position from the estimated object state; and,  
determining a guidance command from the predicted position of the  
object.

10               25. A method for guiding a device toward an object according to claim 24  
comprising the steps of:

transmitting the predicted position of the object from a remote  
location to the device;  
wherein the step of determining a guidance command is performed  
15 on the device.

26. A method for guiding a device toward an object according to claim  
24, comprising the steps of;

obtaining device position parameters;  
20 determining at a remote location a time-to-intercept; and,  
transmitting the time-to-intercept from the remote location to the  
device.